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## PATENT ABSTRACTS OF JAPAN

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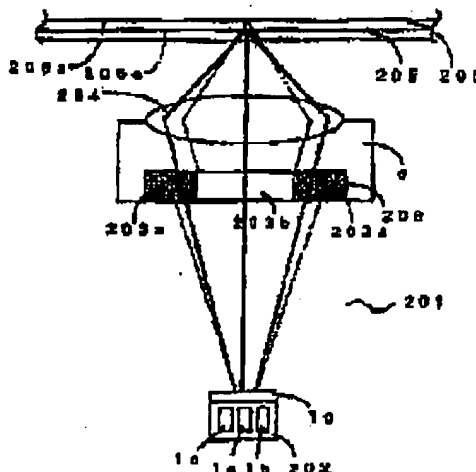
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### (54) OPTICAL PICKUP DEVICE

#### (57)Abstract:

**PROBLEM TO BE SOLVED:** To make it possible to interchangeably reproduce optical disks different in the thickness of a substrate by selectively generating a first laser beam having a first wavelength and a second laser beam having a second wavelength different from the first wavelength.

**SOLUTION:** A laser beam transmitted from semiconductor lasers 1a, 1b in an optical means 202 having a wavelength 480 (allowable range: 350-550nm) or a wavelength 635 (allowable range  $\pm 15$ )nm is selectively diffracted by a hologram 1g provided on the surface of the optical means 202, selectively shielded by an numerical aperture changing means 203 and made incident on an objective lens 204. The laser beam converted by the objective lens 204 passes through a substrate 205 made of transparent polycarbonate and projected on the signal recording surface 205a of an optical disk. The laser beam reflected by the signal recording surface 205a returns through the substrate 205, the objective lens 204 and the numerical aperture changing means 203 and is detected by a photodetector 1c provided in the optical means 202 through the hologram 1g.



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Serial No. 09/442,095  
Docket No. 1349.1016  
Claims As Allowed December 3, 2003

1. (original) An optical pickup comprising:
  - a first laser beam source generating a first laser beam;
  - a second laser beam source generated a second laser beam having a different wavelength than the first laser beam;
  - an optical system projecting the first and second laser beams to a signal layer of an optical disk and transmitting the first and second laser beams as reflected from the signal layer;
  - an optical detector detecting the first and second laser beams transmitted from the optical system, the optical detector being optimized with respect to the second laser beam; and
  - an optical converter converting the first laser beam transmitted from the optical system into the laser beam detectable by the optical detector.
2. (original) The optical pickup as claimed in claim 1, wherein the first and second laser beam sources comprise laser diodes.
3. (original) The optical pickup as claimed in claim 1, wherein the optical system comprises:
  - a first collimating lens diverging the first laser beam at a predetermined angle that permits a fracture surface aberration of the first laser beam to fall below a predetermined value when the first laser beam generated from the first laser beam source is collected on the signal layer of the optical disk;
  - a second collimating lens converting the second laser beam generated from the second laser beam source into a parallel ray;
  - a prism reflecting the laser beams transmitted through the first and second collimating lenses toward the optical disk, while transmitting the laser beams reflected from the signal layer of the optical disk;
  - an objective lens collecting the laser beams reflected from the prism onto the signal layer of the optical disk; and
  - a light receiving lens collecting the laser beam reflected from the signal layer of the optical disk on the optical detector in the form of an optical spot of a predetermined size.

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4. (original) The optical pickup as claimed in claim 3, wherein the first laser beam has a wavelength of 640-660nm or 770-800nm and the second laser beam has a wavelength of 400-420nm.

5. (original) The optical pickup as claimed in claim 4, wherein the predetermined value is less than or equal to  $0.008\lambda$  where the  $\lambda$  is the wavelength and the predetermined angle ranges from  $0.4^\circ$  to  $0.6^\circ$ .

6. (original) The optical pickup as claimed in claim 1, wherein the optical detector comprises a photo diode.

7. (original) The optical pickup as claimed in claim 1, wherein the optical converter includes a holographic lens having a pattern by which the second laser beam is directly transmitted without conversion, while the first laser beam is converted into parallel rays.

8. (original) The optical pickup as claimed in claim 7, wherein the pattern has a concentric annular concave-convex portion in which a plurality of annular prominences and depressions are arranged.

9. (original) The optical pickup as claimed in claim 8, wherein the depression and the prominence have a width that gradually decreases from the center of the optical converter toward the most outer circumference of the concentric annular concave-convex portion.

10. (original) The optical pickup as claimed in claim 8, wherein an inner surface of each prominence has a step-like shape formed with at least one step.

11. (original) The optical pickup as claimed in claim 10, wherein the number of the step ranges from three to five.

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12. (original) An optical pickup comprising:
- a first laser diode generating a first laser beam;
  - a second laser diode generating a second laser beam having a different wavelength than the first laser beam;
  - a first collimating lens diverging the first laser beam at a predetermined angle;
  - a second collimating lens converting the second laser beam into parallel rays;
  - a prism reflecting the laser beams transmitted through the first and second collimating lenses toward an optical disk, and transmitting reflected laser beams from a signal layer of the optical disk;
  - an objective lens collecting the reflected laser beams from the prism on the signal layer of the optical disk;
  - a light receiving lens collecting the reflected laser beams from the signal layer of the optical disk in the form of optical spot of a predetermined size;
  - a photo diode detecting the optical spot collected by the light receiving lens; and
  - a holographic lens converting the first laser beam into parallel rays so as to form the optical spot, of the first and second laser beams having identical sizes.
13. (original) An optical disk drive comprising:
- an optical pickup projecting a laser beam to an optical disk and detecting a signal from the reflected laser beam, said optical pickup comprising:
    - first and second laser beam sources generating a first and second laser beams respectively, the first and second laser beams having different wavelengths;
    - an optical system projecting the first and second laser beams onto a signal layer of the optical disk;
    - detecting means for detecting the first and second laser beams as reflected from the signal layer of the optical disk; and
    - optical converting means for converting the first and second laser beams as reflected from the signal layer of the optical disk so that the converted first and second laser beams are detectable by the optical detecting means; and
  - a driving section moving the optical pickup to a desired portion of the optical disk;
  - a signal processing section processing the signal detected by the optical pickup and converting the signal into information; and

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a controlling section for controlling the optical pickup, the driving section, the signal processing section.

14. (original) The optical disk drive as claimed in claim 13, wherein the first and second laser beam sources comprise laser diodes.

15. (original) The optical disk drive as claimed in claim 13, wherein the optical system comprises:

a first collimating lens diverging the first laser beam at a predetermined angle;

a second collimating lens converting the second laser beam into parallel rays;

a prism reflecting laser beams transmitted through the first and second collimating lenses toward the optical disk, and transmitting the first and second laser beams as reflected from the signal layer of the optical disk;

an objective lens for collecting laser beams reflected from the prism on the signal layer of the optical disk; and

a light receiving lens for collecting laser beams reflected from the signal layer of the optical disk on the detecting means in the form of optical spot of a predetermined size.

16. (original) The optical disk drive as claimed in claim 13, wherein the detecting means comprises a photo diode.

17. (original) The optical disk drive as claimed in claim 13, wherein the optical converting means comprises a holographic lens having a pattern in which the first laser beam is converted into parallel rays so as to cause the size of the optical spots generated by the first and second laser beams to be identical.

18. (cancelled)

19. (cancelled)

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20. (previously presented) An optical pickup comprising:
- a first light source;
  - a second light source, the second light source generating a different wavelength light than the first light source;
  - an optical system projecting light beams to a signal layer of a recording medium and transmitting reflections of the light beams from the signal layer;
  - an optical detector detecting the light beams transmitted from the optical system, the optical detector being optimized to detect a light beam generated by the second light source;
  - and
  - an optical converter converting a light beam generated by the first light source, transmitted from the optical system, into a light beam detectable by the optical detector.